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Cyber Security to the Edge: Applying Edge Theory to Cyber Security Operations

Topics

Topic 11: Cyberspace Management
Topic 2: Approaches and Organizations
Topic 5: Collaboration, Shared Awareness, and Decision Making

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14. ABSTRACT
Defending Department of Defense networks is a complex endeavor. Our current method of defending networks starts with topdown rules, policies and regulations. These rules and regula-tions are complex and in many cases may be redundant or contradicted to meet an urgent opera-tional requirement. Additionally the requirements contained in these policies are not always funded. This paper will examine if edge organizational techniques and Edge Theory could be applied to cyber security organizations to improve the defense of DoD networks.

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Abstract

Defending Department of Defense networks is a complex endeavor. Our current method of defending networks starts with topdown rules, policies and regulations. These rules and regulations are complex and in many cases may be redundant or contradicted to meet an urgent operational requirement. Additionally the requirements contained in these policies are not always funded. This paper will examine if edge organizational techniques and Edge Theory could be applied to cyber security organizations to improve the defense of DoD networks.

Introduction

Defending Department of Defense networks is a complex endeavor with an extensive amount of topdown rules, policies and regulations. These rules and regulations are complex and in many cases may be redundant or contradicted to meet an urgent operational requirement. In some cases new rules are created across the enterprise in response to a specific event at one part of the organization (i.e. Wiki leaks) without much thought to the impact on the entire organization. Additionally the requirements contained in these policies are not always funded. DoD networks could be better defended by organizing as an edge organization. This paper will introduce this concept and start the discussion to examine if edge organizational techniques and edge theory could be applied to cyber security organizations to improve the defense of DoD networks.

Edge Theory

In order to understand why an Edge organization will improve the performance of a cyber security organization we must have a common definition of an Edge organization and understand the characteristics of an Edge organization. Alberts defines an Edge organization as "Edge organizations are organizations where everyone is empowered by information and has the freedom to do what makes sense" [1]. Members in an Edge organization members are empowered to share information and most relationships are of a peer-to-peer nature. This eliminates the distinction between line and support personnel as well as the associated stovepipes of that artificial division. By flattening an organization the requirement for the "middle" part of an organization that relays communications within that organization is greatly reduced. This reduction of the "middle" and stovepipes removes "barriers to information sharing and collaboration" within that organization and between the components of that organization [1].

Current Top Down Structure

Under our current cyber structure senior leadership develops high level and detailed policy guidance along with extensive reporting requirements. The DoD Information Assurance Technology Analysis Center has a chart (Figure 1) that displays all of the guidance required to "Build and Operate a Trusted GIG" [2].

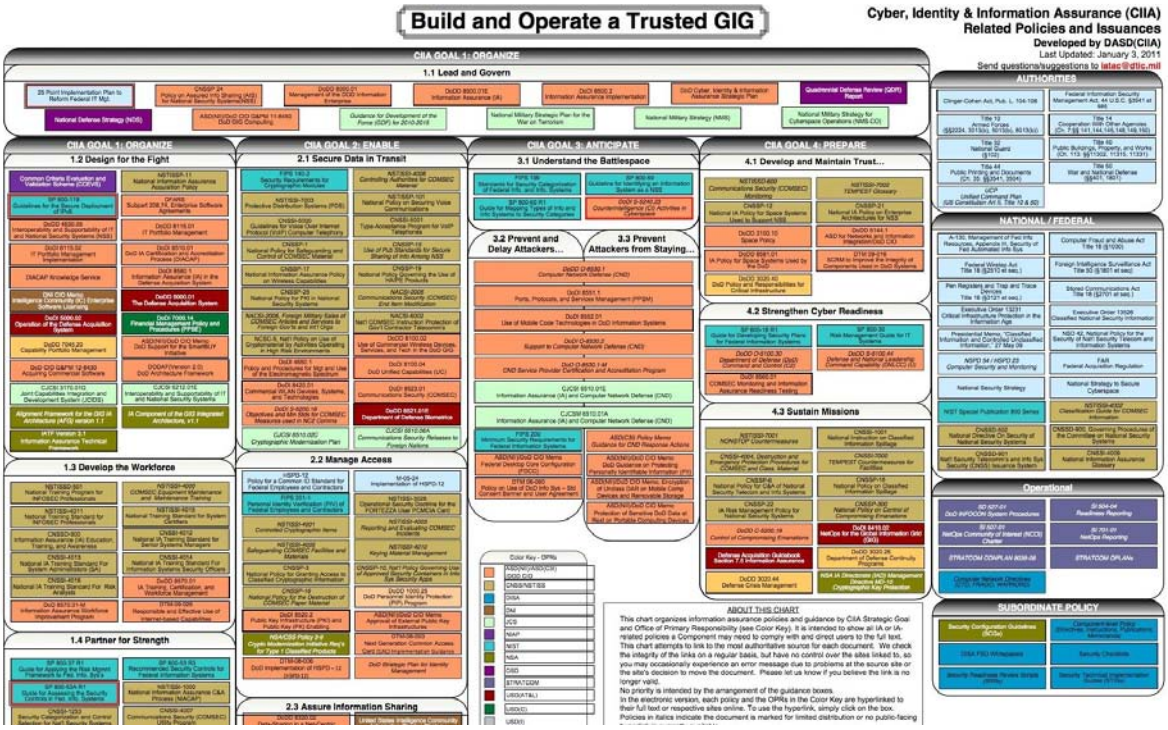

Figure 1 (IATC 2011)

In addition to this high level and detailed DoD guidance there is an abundance of similar guidance at the service and operational level. In many cases the operational guidance is a copy of the high level guidance. Although the chart depicts the policy and divides them up into functional areas there is no mapping of policy relationships. For example the DoD Information Assurance Certification and Accreditation Process (DIACAP) policy does not map to the prevention and delaying attacks guidance so the people actually defending the networks and information systems may not have any visibility into the certification packages, which describe how systems are secured and associated risks, of the systems they are defending.

This centralized planning model does not lend itself to quick and agile defense of cyber assets. For successful centralized planning the central leadership must be able to “make sense of the situation, maintain this understanding in the face of a dynamic environment, predict the future, develop an appropriate response strategy, decompose the response into a coherent set of executable tasks, allocate resources, task subordinates, monitor execution, and make adjustments as required, all in a timely manner” [1].

With the complexity of even one information system that has thousands, if not millions lines of code and a multitude of possible configurations a centralized organization can’t possibly maintain control and understand the diverse configurations of these systems. The complexity of the systems and multitude of attack vectors (email, malicious websites, brute force, social engineering, phishing, malicious insiders) inhibit the effectiveness of a centralized planning model. With the large scale number of attacks on DoD networks “The Pentagon's top information-

security official, Robert Lentz, said the Defense Department detected 360 million attempts to penetrate its networks last year, up from six million in 2006“ [3].

With such a high number of attacks how can a hierarchical and centralized organization manage the response to so many attempted attacks? “Cyberwarfare is like maneuver warfare, in that speed and agility matter most”[4]. By moving to an edge cyber security organization and allowing action at the edge make it easier to defend and respond to cyber attacks.

The Fog of War in Cyber Warfare

Information overload is one of the major factors for “fog of war” in cyber warfare. If every organization followed the current rules they would conduct recurring vulnerability scans and this data would be fed into different databases so the chain of command would have a list of 1000’s of vulnerabilities but does this enhance the overall security of the scanned systems if the owners don’t have the tools or manpower to resolve those vulnerabilities? With the amount and complexity of this data there is no way for a centralized organization make sense of this. This is analogous to telling Platoon commander to defend a street block but instead of letting him deploy his troops he would first have to scan the block for vulnerabilities on a checklist and submit those vulnerabilities to higher HQ. Many of the vulnerabilities on the checklist might not be applicable to the current situation, higher headquarters would asses the listed vulnerabilities them and tell the Platoon Commander which ones to fix. As this data makes its way up the chain of command the enemy disposition is constantly changing and by the time a response is received from upper echelon it may be too late to defend the block. Instead of doing this the Army develops tactics, techniques and procedures (TTPs) for the Platoon Commander to utilize that can be modified based on the local situation.

The attacker has the advantage in cyber warfare, the attacker only needs to know one vulnerability to gain access to a system while the defender must monitor all vulnerabilities. This advantage is increased when a defender operates in a hierarchical organization and must wait for top down direction to take action. Local units defending their own networks would have a smaller footprint and less data to monitor making it easier to detect attacks.

Cyber Warfare Command and Control

Even in an edge organization leadership must be involved in setting overall guidance and have situational awareness to the overall health of their systems. Under current vulnerability system the status individual systems are reported up the chain of command. A commander doesn’t need to know the exact status of each system, rather he needs to know the impact of those vulnerabilities. In an edge organization the commander would establish high level goals and requirements. A good example of establishing high level guidance is the “Ten Things Every Airman

Must Know in the United States Air Force Doctrine Document 3-12 of 15 July 2010 "Cyberspace Operations":

1. The United States is vulnerable to cyberspace attacks by relentless adversaries attempt ing to infiltrate our networks at work and at home – millions of times a day, 24/7.
2. Our enemies plant malicious code, worms, botnets, and hooks in common websites, software, and hardware such as thumbdrives, printers, etc.
3. Once implanted, this code begins to distort, destroy, and manipulate information, or ―phone‖ it home. Certain code allows our adversaries to obtain higher levels of credentials to access highly sensitive information.
4. The enemy attacks your computers at work and at home knowing you communicate with the Air Force network by email, or transfer information from one system to another.
5. As cyber wingmen, you have a critical role in defending your networks, your information, your security, your teammates, and your country.
6. You significantly decrease our enemies' access to our networks, critical USAF information, and even your personal identity by taking simple action.
7. Do not open attachments or click on links unless the email is digitally signed, or you can directly verify the source—even if it appears to be from someone you know.
8. Do not connect any hardware or download any software applications, music, or information onto our networks without approval
9. Encrypt sensitive but unclassified and/or critical information. Ask your computer systems administrator (CSA) for more information
10. Install the free Department of Defense anti-virus software on your home computer. Your CSA can provide you with your free copy" [5].

This guidance is easy too understand and implement. One can boil down the current policy to some similarly simply stated goals that could be implemented in an edge Organization:

1. Resilient network and information systemsBuild resilience at local level
2. Design secure systems from the start
3. Secure your system from current known vulnerabilities and monitor for attacks on open vulnerabilities
4. Monitor your system
5. Correlate attacks to known vulnerabilities
6. Respond to attacks
7. Communicate with higher headquarters

(Author's interpretation of guidance listed on IATC 2011 [2])

Creating an Edge Cyber Security Organization

In order to become an edge cyber security organization we should consider locations as nodes on a network and empower those nodes to defend themselves and their neighbors. The term neighbors is used in the relationship between nodes on a network not their physical location. The first step would be to identify the policy that enhances cyber security, for example manning requirements to defend a local enclave. The next step can be done by providing pre built templates like the current Defense Information System Agency Gold Disk templates for

common functions and let them develop defense for their unique systems. These nodes would also need visibility into their local network traffic and tools to asses their local vulnerabilities. There are already a variety of tools in use by the DOD that can accomplish this. They would also communicate with their neighbors and gain value by some type of mutual defense. To test the effectiveness of an edge organization a test enclave could be established that is empowered to defend their own network and communicate directly with anyone along their network path. Although a detailed test would have to be developed, below are some areas that could be measured to see the effectiveness of an edge organization [6]:

Quality of organic information

- Awareness of what is on the enclave

- Awareness of attacks (successful and unsuccessful

- Awareness of vulnerabilities

Quality of organic Information

Quality of Individual Sense making

- Do the operators understand what is on their network

Quality of interactions

Degree of shared information

Extent: Measure flow of information from enclave to neighboring enclaves, CND service providers, and higher HQ. This could be measured by: exchange of correlating IDS alerts, exchange of vulnerability alerts and status of connected systems (i.e. Vulnerabilities, accepted risk) [6].

The data collected from this test could be compared with similar data from other enclaves to see if there was an improvement in overall security

In many cases a cyber security event in one node can impact another node or have a broader impact to the organization. Systems that have any possibility of impacting outside of a node or that can have a broader impact on the enterprise would have to be identified and specific reporting requirements would have to be developed to notify the chain of command with appropriate time reporting requirements. This could be accomplished in many ways including the use of auto-reporting network sensors. Some examples of automatic external reporting requirements:

- Public exposure of sensitive or classified data

- Identification of self replicating worm
- Insider attack from one node to another

It is difficult for non security experts to understand the current way security incidents are handled. To better illustrate this the story below applies the methods we use to respond to computer attacks to the Navy Medical system.

Applying the Current Cyber Defense Workflow to the Medical System

Seaman Timmy (compromised computer) assigned to a ship catches the flu. The Navy Medical Command (Service Computer Emergency Response Team)in Bethesda, MD sends the corpsman on the ship an alert (intrusion detection alerts) that someone, but not a specific person, is sick and that he needs to be isolated immediately. The corpsman must search the ship to find the sick Sailor. Once found the corpsman must contact the medical command and receive guidance on how to aid Seaman Timmy. If the corpsman doesn't answer all questions there may be additional questions. The Medical Commands directive to isolate Seaman Timmy may endanger the ship since Seaman Timmy is the helmsman, steering the ship while at sea, (critical system). Once all of the information has been received by the medical command they will tell the corpsman to respond. Lets say the diagnose is a bacterial infection the medical command may prescribe an antibiotic. Since they don't have access to Seaman Timmy's medical record (DIACAP package) they may not know he is allergic to antibiotics putting him at risk.

How would an edge organization better handle the response to a computer attack? First a local sensor or other cueing detects compromised host. Local network defender locates system and determines criticality of the system. Since they know the most about the system they can take the best steps to immediately isolate that system with the least impact. The local defenders would also know the system's relationship and possible impact to connected systems and could alert adjacent system defenders as appropriate.

Conclusion

Defending the global information grid against attacks from Nation States, individual hackers, organized crime and malicious insiders is a complex task and problem. Solving complex problems requires innovative solutions that push down responsibility and empower people at the local level to defend their networks and systems. Self organized groups of defenders in an edge organization offers many advantages to the current top down hierarchal structure. These advantages include quicker response to network attacks by empowering individuals at the unit level, resilient networks by improving information sharing and reducing the administrative burden by removing redundant policy and flattening the cyber security organization. Higher echelons would have better situational awareness because they could focus on information from the edge that has been identified as critical rather that sifting through huge amounts of data reports without context.

References

[1] Alberts, D.S. and Hayes, R.E. (2003). *Power to the Edge*. Washington, DC: CCRP.

[2] Build and Operate a Trusted GIG. (2011). [Cyber, Identity &Information Assurance (CIIA) Related Policies and Issuances]. Information Assurance Technology Analysis Center. Retrieved from: http://iac.dtic.mil/iatac/download/ia_policychart.pdf

[3] Dreazen, Y.J. And Gorman, S. (6 May 2009). U.S. Cyber Infrastructure Vulnerable to Attacks.
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[6] Office of Force Transformation. (2003). Network Centric Operations Conceptual Framework Version 1.0. Vienna, VA: Evidence Based Research.

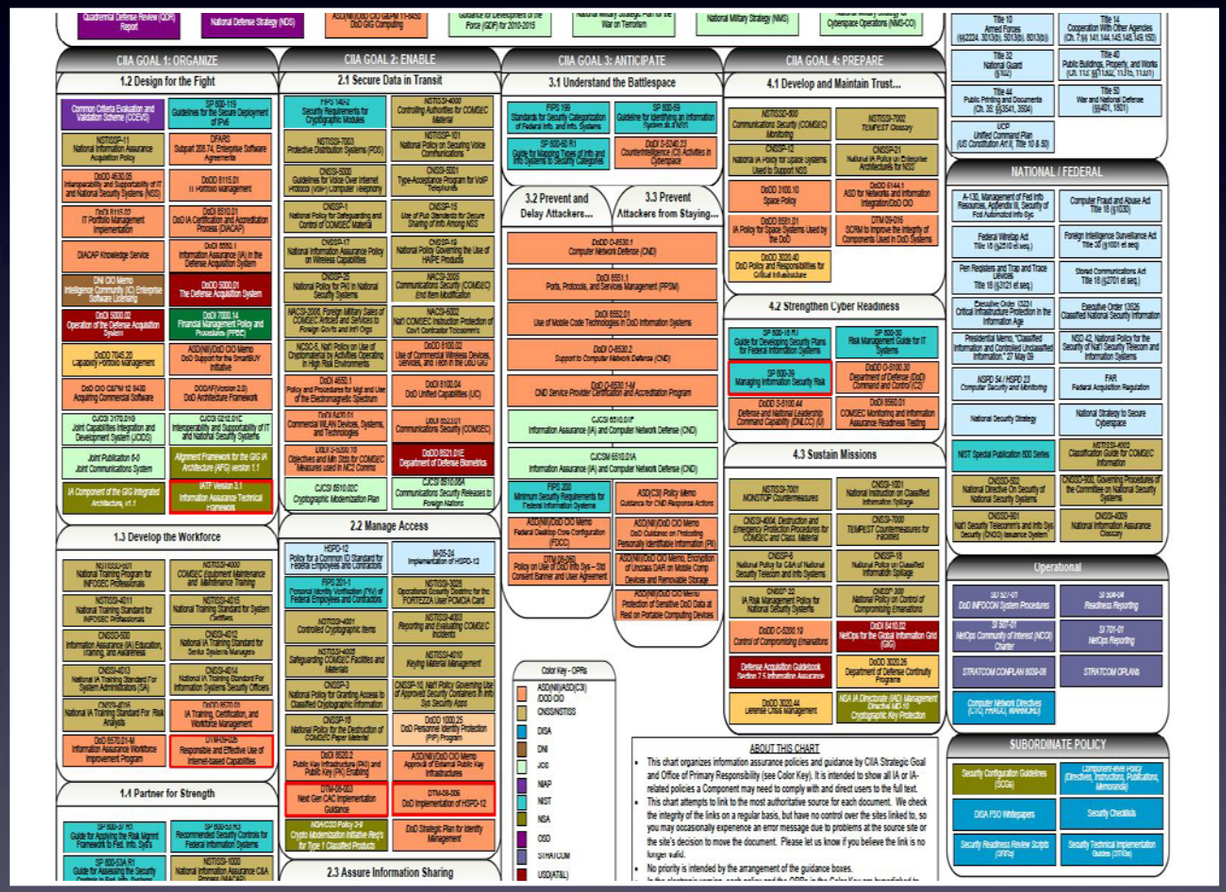
Cyber Security to the Edge

Applying Edge Theory to Cyber Security Operations

Chris Simpson

Defending DoD Networks

- Top Down Approach
- Complex
- Rules to meet urgent requirements or specific events



Top Down Structure

- "Abundance" of guidance
- Certification and Accreditation process versus real security
- Centralized planning versus agile hackers

Build and Operate a Trusted GIG

Cyber, Identity & Information Assurance (CIIA) Related Policies and Issuances

Developed by DASD(CIIA)
Last Updated: April 4, 2011
Send questions/suggestions to iatac@dtic.mil

CIIA GOAL 1: ORGANIZE

1.1 Lead and Govern

- 25 Point Implementation Plan to Reform Federal IT Mgt
- Cyberspace Policy Review
- CNSSP 24 Policy on Assured Info Sharing (AIS) for National Security Systems(NSS)
- DoDD 8000.01 Management of the DOD Information Enterprise
- DoDD 8500.01E Information Assurance (IA)
- DoDI 8500.2 Information Assurance Implementation
- DoD Cyber, Identity & Information Assurance Strategic Plan
- Quadrennial Defense Review (QDR) Report
- National Defense Strategy (NDS)
- ASD(NII)/DoD CIO G&PM 11-8450 DoD GIG Computing
- Guidance for Development of the Force (GDF) for 2010-2015
- National Military Strategic Plan for the War on Terrorism
- National Military Strategy (NMS)
- National Military Strategy for Cyberspace Operations (NMS-CO)

CIIA GOAL 1: ORGANIZE

1.2 Design for the Fight

- Common Criteria Evaluation and Validation Scheme (CCEVS)
- SP 800-119 Guidelines for the Secure Deployment of IPv6
- NSTISSP-11 National Information Assurance Acquisition Policy
- DFARS Subpart 208.74, Enterprise Software Agreements
- DoDD 4630.05 Interoperability and Supportability of IT and National Security Systems (NSS)
- DoDD 8115.01 IT Portfolio Management
- DoDI 8115.02 IT Portfolio Management Implementation
- DoDI 8510.01 DoD IA Certification and Accreditation Process (DIACAP)
- DIACAP Knowledge Service
- DoDI 8580.1 Information Assurance (IA) in the Defense Acquisition System
- DNI CIO Memo Intelligence Community (IC) Enterprise Software Licensing
- DoDD 5000.01 The Defense Acquisition System
- DoDI 5000.02 Operation of the Defense Acquisition System
- DoDI 7000.14 Financial Management Policy and Procedures (FMPP)
- DoDD 7045.20 Capability Portfolio Management
- ASD(NII)/DoD CIO Memo DoD Support for the SmartBUY Initiative
- DoD CIO G&PM 12-8430 Acquiring Commercial Software
- DODAF(Version 2.0) DoD Architecture Framework
- CJCSI 3170.01G Joint Capabilities Integration and Development System (JCIDS)
- CJCSI 6212.01E Interoperability and Supportability of IT and National Security Systems
- *Joint Publication 6-0 Joint Communications System*
- *Alignment Framework for the GIG IA Architecture (AFG) version 1.1*
- *IA Component of the GIG Integrated Architecture, v1.1*
- IATF Version 3.1 Information Assurance Technical Framework

1.3 Develop the Workforce

- NSTISSD-501 National Training Program for INFOSEC Professionals
- NSTISSI-4000 COMSEC Equipment Maintenance and Maintenance Training
- NSTISSI-4011 National Training Standard for INFOSEC Professionals
- NSTISSI-4015 National Training Standard for System Certifiers
- CNSSD-500 Information Assurance (IA) Education, Training, and Awareness
- CNSSI-4012 National IA Training Standard for Senior Systems Managers
- CNSSI-4013 National IA Training Standard For System Administrators (SA)
- CNSSI-4014 National IA Training Standard For Information Systems Security Officers
- CNSSI-4016 National IA Training Standard For Risk Analysts
- DoDD 8570.01 IA Training, Certification, and Workforce Management
- DoD 8570.01-M Information Assurance Workforce Improvement Program
- DTM-09-026 Responsible and Effective Use of Internet-based Capabilities

1.4 Partner for Strength

- SP 800-37 R1 Guide for Applying the Risk Mgmnt Framework to Fed. Info. Sys's
- SP 800-53 R3 Recommended Security Controls for Federal Information Systems
- SP 800-53A R1 Guide for Assessing the Security Controls in Fed. Info. Systems
- NSTISSI-1000 National Information Assurance C&A Process (NIACAP)
- CNSSI-1253 Security Categorization and Control Selection for Nat'l Security Systems
- CNSSI-4007 Communications Security (COMSEC) Utility Program
- CNSSI-4009 Program for the Mgt and Use of Nat'l Reserve IA Security Equipment
- CNSSP-14 National Policy Governing the Release of IA Products/Services...
- DoDI 5205.13 Defense Industrial Base Cyber Security / IA Activities
- IC/D 503 IT Systems Security Risk Management and C&A

CIIA GOAL 2: ENABLE

2.1 Secure Data in Transit

- FIPS 140-2 Security Requirements for Cryptographic Modules
- *NSTISSI-4005 Controlling Authorities for COMSEC Material*
- NSTISSI-7003 Protective Distribution Systems (PDS)
- NSTISSP-101 National Policy on Securing Voice Communications
- CNSSI-5000 Guidelines for Voice Over Internet Protocol (VoIP) Computer Telephony
- CNSSI-5001 Type-Acceptance Program for VoIP Telephones
- CNSSP-1 National Policy for Safeguarding and Control of COMSEC Material
- *CNSSP-15 Use of PKI Standards for Secure Sharing of Info Among NSS*
- CNSSP-17 National Information Assurance Policy on Wireless Capabilities
- CNSSP-19 National Policy Governing the Use of HAIPE Products
- CNSSP-25 National Policy for PKI in National Security Systems
- *NACSI-2005 Communications Security (COMSEC) End Item Modification*
- *NACSI-2006, Foreign Military Sales of COMSEC Articles and Services to Foreign Govts and Int'l Orgs*
- NACSI-6002 Nat'l COMSEC Instruction Protection of Gov't Contractor Telecomm's
- NCSC-5, Nat'l Policy on Use of Cryptomaterial by Activities Operating in High Risk Environments
- DoDD 8100.02 Use of Commercial Wireless Devices, Services, and Tech in the DoD GIG
- DoDI 4650.1 Policy and Procedures for Mgt and Use of the Electromagnetic Spectrum
- DoDI 8100.04 DoD Unified Capabilities (UC)
- DoDI 8420.01 Commercial Wi/LAN Devices, Systems, and Technologies
- DoDI 8523.01 Communications Security (COMSEC)
- *DoDI S-5200.16 Objectives and Min Stds for COMSEC Measures used in NCI Comms*
- DoDD 8521.01E Department of Defense Biometrics
- CJCSI 6510.02C Cryptographic Modernization Plan
- CJCSI 6510.06A Communications Security Releases to Foreign Nations

2.2 Manage Access

- HSPD-12 Policy for a Common ID Standard for Federal Employees and Contractors
- M-05-24 Implementation of HSPD-12
- FIPS 201-1 Personal Identity Verification (PIV) of Federal Employees and Contractors
- NSTISSI-3028 Operational Security Doctrine for the FORTEZZA User PCMCIA Card
- *NSTISSI-4001 Controlled Cryptographic Items*
- *NSTISSI-4003 Reporting and Evaluating COMSEC Incidents*
- *NSTISSI-4005 Safeguarding COMSEC Facilities and Materials*
- *NSTISSI-4010 Keying Material Management*
- CNSSP-3 National Policy for Granting Access to Classified Cryptographic Information
- *CNSSP-10, Nat'l Policy Governing Use of Approved Security Containers in Info Sys Security Apps*
- *CNSSP-16 National Policy for the Destruction of COMSEC Paper Material*
- DoDD 1000.25 DoD Personnel Identity Protection (PIP) Program
- DoDI 8520.2 Public Key Infrastructure (PKI) and Public Key (PK) Enabling
- ASD(NII)/DoD CIO Memo Approval of External Public Key Infrastructures
- DTM-08-003 Next Gen CAC Implementation Guidance
- DTM-08-006 DoD Implementation of HSPD-12
- *NSA/CSS Policy 3-9 Crypto Modernization Initiative Req'ts for Type 1 Classified Products*
- *DoD Strategic Plan for Identity Management*

2.3 Assure Information Sharing

- DoDD 8320.02 Data-Sharing in a Net-Centric Department of Defense
- United States Intelligence Community Information Sharing Strategy
- *ASD(NII)/DoD CIO Memo Use of Peer-to-Peer File Sharing Applications Across DoD*
- DTM-08-027 Security of Unclassified DoD Information on Non-DoD Info Systems
- DoD Information Sharing Strategy
- Cross Domain Community Roadmap
- CJCSI 6211.02C Defense Information System Network: Policy and Responsibilities
- *CJCSM 3213.02C Joint Staff Focal Point*

CIIA GOAL 3: ANTICIPATE

3.1 Understand the Battlespace

- FIPS 199 Standards for Security Categorization of Federal Info. and Info. Systems
- SP 800-59 Guideline for Identifying an Information System as a NSS
- SP 800-60 R1 Guide for Mapping Types of Info and Info Systems to Security Categories
- *DoDI S-5240.23 Counterintelligence (CI) Activities in Cyberspace*

3.2 Prevent and Delay Attackers...

- *DoDD O-8530.1 Computer Network Defense (CND)*
- DoDI 8551.1 Ports, Protocols, and Services Management (PPSM)
- DoDI 8552.01 Use of Mobile Code Technologies in DoD Information Systems
- *DoDI O-8530.2 Support to Computer Network Defense (CND)*
- *DoD O-8530.1-M CND Service Provider Certification and Accreditation Program*
- CJCSI 6510.01F Information Assurance (IA) and Computer Network Defense (CND)
- CJCSM 6510.01A Information Assurance (IA) and Computer Network Defense (CND)
- FIPS 200 Minimum Security Requirements for Federal Information Systems
- *ASD(C3I) Policy Memo Guidance for CND Response Actions*
- ASD(NII)/DoD CIO Memo Federal Desktop Core Configuration (FDCC)
- ASD(NII)/DoD CIO Memo DoD Guidance on Protecting Personally Identifiable Information (PII)
- DTM 08-060 Policy on Use of DoD Info Sys – Std Consent Banner and User Agreement
- ASD(NII)/DoD CIO Memo, Encryption of Unclass DAR on Mobile Comp Devices and Removable Storage
- ASD(NII)/DoD CIO Memo Protection of Sensitive DoD Data at Rest on Portable Computing Devices

3.3 Prevent Attackers from Staying...

CIIA GOAL 4: PREPARE

4.1 Develop and Maintain Trust...

- *NSTISSD-600 Communications Security (COMSEC) Monitoring*
- *NSTISSI-7002 TEMPEST Glossary*
- CNSSP-12 National IA Policy for Space Systems Used to Support NSS
- CNSSP-21 National IA Policy on Enterprise Architectures for NSS
- DoDD 3100.10 Space Policy
- DoDD 5144.1 ASD for Networks and Information Integration/DoD CIO
- DoDD 8581.01 IA Policy for Space Systems Used by the DoD
- DTM 09-016 SCRM to Improve the Integrity of Components Used in DoD Systems
- DoDD 3020.40 DoD Policy and Responsibilities for Critical Infrastructure

4.2 Strengthen Cyber Readiness

- SP 800-18 R1 Guide for Developing Security Plans for Federal Information Systems
- SP 800-30 Risk Management Guide for IT Systems
- SP 800-39 Managing Information Security Risk
- *DoDD O-5100.30 Department of Defense (DoD) Command and Control (C2)*
- *DoDD S-5100.44 Defense and National Leadership Command Capability (DNLCC) (U)*
- DoDI 8560.01 COMSEC Monitoring and Information Assurance Readiness Testing

4.3 Sustain Missions

- *NSTISSI-7001 NONSTOP Countermeasures*
- CNSSI-1001 National Instruction on Classified Information Spillage
- CNSSI-4004, Destruction and Emergency Protection Procedures for COMSEC and Class. Material
- CNSSI-7000 TEMPEST Countermeasures for Facilities
- CNSSP-6 National Policy for C&A of National Security Telecom and Info Systems
- CNSSP-18 National Policy on Classified Information Spillage
- CNSSP-22 IA Risk Management Policy for National Security Systems
- CNSSP-300 National Policy on Control of Compromising Emanations
- *DoDD C-5200.19 Control of Compromising Emanations*
- DoDI 8410.02 NetOps for the Global Information Grid (GIG)
- Defense Acquisition Guidebook Section 7.5 Information Assurance
- DoDD 3020.26 Department of Defense Continuity Programs
- DoDD 3020.44 Defense Crisis Management
- *NSA IA Directorate (IAD) Management Directive MD-10 Cryptographic Key Protection*

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- Title 14 Cooperation With Other Agencies (Ch. 7;§§ 141,144,145,148,149,150)
- Title 32 National Guard (§102)
- Title 40 Public Buildings, Property, and Works (Ch. 113: §§11302, 11315, 11331)
- Title 44 Public Printing and Documents (Ch. 35: §§3541, 3504)
- Title 50 War and National Defense (§§401, 1801)
- UCP Unified Command Plan (US Constitution Art II, Title 10 & 50)

NATIONAL / FEDERAL

- A-130, Management of Fed Info Resources, Appendix III, Security of Fed Automated Info Sys
- Computer Fraud and Abuse Act Title 18 (§1030)
- Federal Wiretap Act Title 18 (§2510 et seq.)
- Foreign Intelligence Surveillance Act Title 50 (§1801 et seq)
- Pen Registers and Trap and Trace Devices Title 18 (§3121 et seq.)
- Stored Communications Act Title 18 (§2701 et seq.)
- Executive Order 13231 Critical Infrastructure Protection in the Information Age
- Executive Order 13526 Classified National Security Information
- Presidential Memo, "Classified Information and Controlled Unclassified Information," 27 May 09
- NSD 42, National Policy for the Security of Nat'l Security Telecom and Information Systems
- *NSPD 54 / HSPD 23 Computer Security and Monitoring*
- FAR Federal Acquisition Regulation
- National Security Strategy
- National Strategy to Secure Cyberspace
- NIST Special Publication 800 Series
- *NISTISSI-4002 Classification Guide for COMSEC Information*
- CNSSD-502 National Directive On Security of National Security Systems
- CNSSD-900, Governing Procedures of the Committee on National Security Systems
- CNSSD-901 Nat'l Security Telecomm's and Info Sys Security (CNSS) Issuance System
- CNSSI-4009 National Information Assurance Glossary

Operational

- *SD 527-01 DoD INFOCON System Procedures*
- *SI 504-04 Readiness Reporting*
- *SI 507-01 NetOps Community of Interest (NCOI) Charter*
- *SI 701-01 NetOps Reporting*
- *STRATCOM CONPLAN 8039-08*
- *STRATCOM OPLANs*
- *Computer Network Directives (CTO, FRAGO, WARNORD)*

SUBORDINATE POLICY

- Security Configuration Guidelines (SCGs)
- *Component-level Policy (Directives, Instructions, Publications, Memoranda)*
- DISA PSO Whitepapers
- Security Checklists
- *Security Readiness Review Scripts (SRRs)*
- Security Technical Implementation Guides (STIGs)

Color Key - OPRs

- ASD(NII)/ASD(C3I) /DOD CIO
- CNSS/NSTISS
- DISA
- DNI
- JCS
- NIAP
- NIST
- NSA
- OSD
- STRATCOM
- USD(AT&L)
- USD(C)
- USD(I)
- USD(P)
- USD(P&R)
- Other Agencies
- Recently updated box

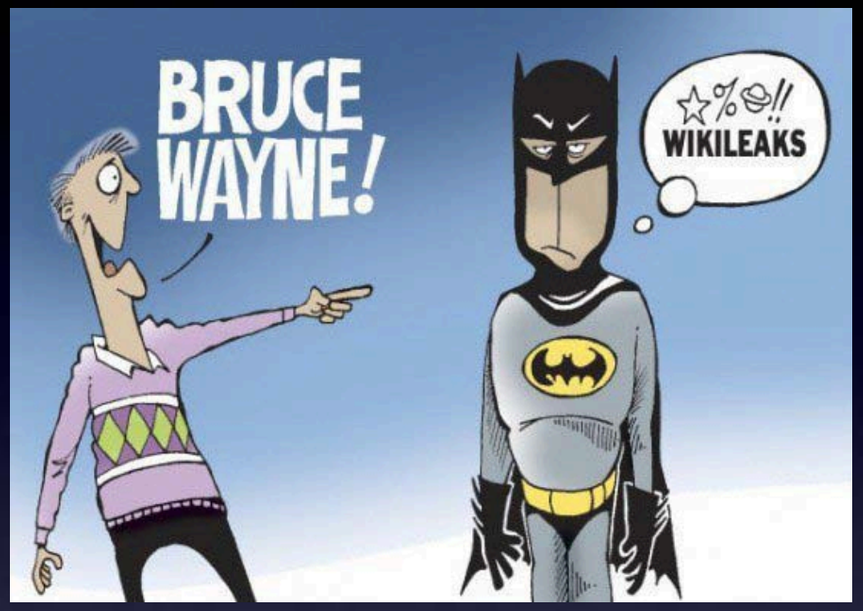
ABOUT THIS CHART

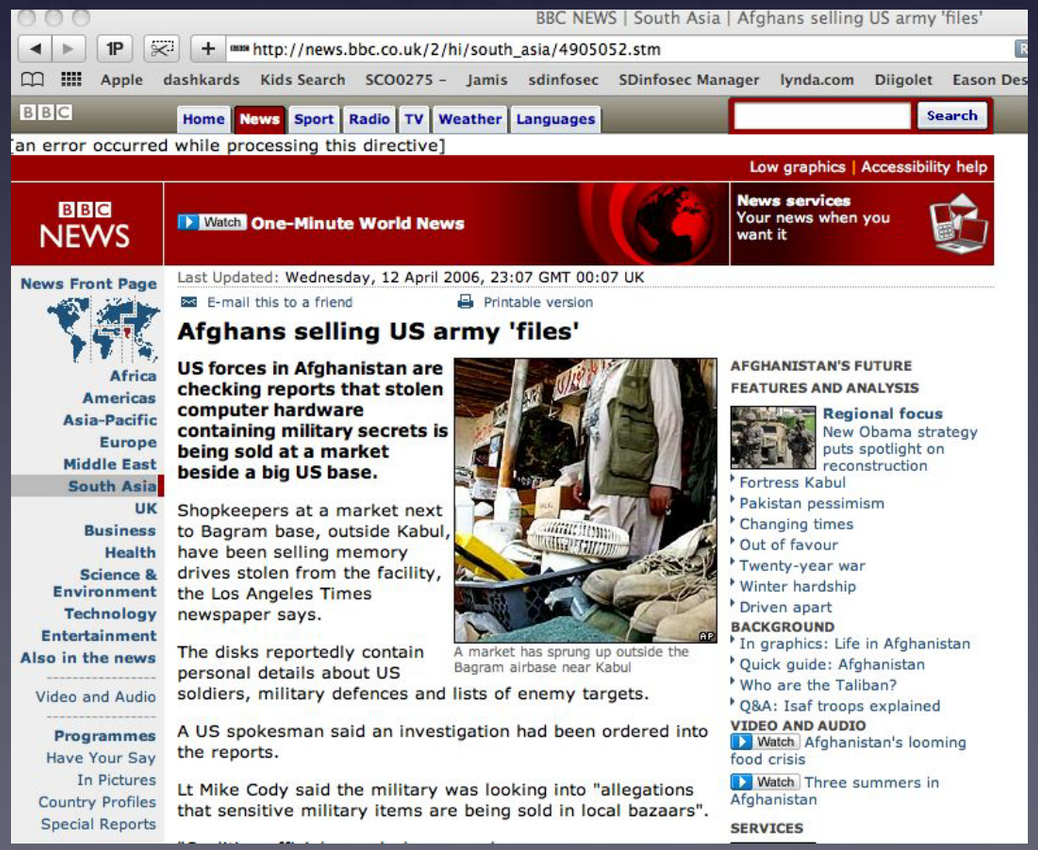
- This chart organizes information assurance policies and guidance by CIIA Strategic Goal and Office of Primary Responsibility (see Color Key). It is intended to show all IA or IA-related policies a Component may need to comply with and direct users to the full text.
- This chart attempts to link to the most authoritative source for each document. We check the integrity of the links on a regular basis, but have no control over the sites linked to, so you may occasionally experience an error message due to problems at the source site or the site's decision to move the document. Please let us know if you believe the link is no longer valid.
- No priority is intended by the arrangement of the guidance boxes.
- In the electronic version, each policy and the OPRs in the Color Key are hyperlinked to their full text or respective sites online. To use the hyperlink, simply click on the box.
- Policies in italics indicate the document is marked for limited distribution or no public-facing hyperlink is currently available.
- Boxes with red borders reflect recent updates.
- For printing, this chart is best viewed on 22"x17" (Size C) paper.
- Note: Users of the iPad, iPhone or iPod Touch may find they can view this Chart but that its hyperlinks are inoperable, because of Apple's decision not to fully support certain Adobe products. For those who desire a workaround for this issue, there are apps in the iTunes store for less than $1.00.
- For the latest version of this chart go to http://iac.dtic.mil/iatac/ia_policychart.html

Complex Systems

- Configuration options
- Locations around the world and rapid deployments
- Limited infrastructure support
- Competing interests and requirements
  - Services, mission etc
- Procurement cycle

Emergent Rules





Edge Theory

- Empowered individuals
- Removal of collaboration barriers

Fog of War in Cyber Warfare

- Information Overload
- Attacker advantage
- Platoon analogy

How would it work?

Cyber Warfare C2

- Keep high level guidance simple
- "Ten Things Every Airman Must Know"
- "Do not open attachments or click on links unless the email is digitally signed, or you can directly verify the source—even if it appears to be from someone you know."
  - United States Air Force (USAF). (2010). Cyberspace Operations

United States Air Force (USAF). (2010). Cyberspace Operations

Keeping It Simple

- Resilient network and information systems, build resilience at local level
- Design secure systems from the start
- Secure your system from current known vulnerabilities and monitor for attacks on open vulnerabilities
- Monitor your system
- Correlate attacks to known vulnerabilities
- Respond to attacks
- Communicate with higher headquarters

An Edge Like Cyber Security Organization Organization

- Identify policy that enhances security, dump the rest
- Use templates like Gold Disk and encourage collaboration and sharing of these (i.e. same IT requirements)
- Provide local network visibility
- Treat CND service providers as sensors to support local enclaves
- Use IA Workforce

Measuring Success

- Quality of organic information
  - ✓ Awareness of what is on the enclave
  - ✓ Awareness of attacks
  - ✓ Awareness of vulnerabilities
- Quality of Individual Sense Making
  - ✓ What do the operators know
- Quality of interactions
  - ✓ Degree of shared information

Cyber Defense Workflow Example

Questions?

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